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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,318	02/01/2002	Pietro Perona	06618/776001/CIT 3395	9800
20985	7590	10/05/2005		
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			EXAMINER BOWEN, MICHAEL WAYNE	
			ART UNIT 2625	PAPER NUMBER

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/066,318		PERONA ET AL.	
	Examiner		Art Unit	
	Michael W. Bowen		2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9, 11-13, 15, 17-23, 25, 26 and 28 is/are rejected.
- 7) ☒ Claim(s) 4, 10, 14, 16, 18-20, 22, 24 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 August 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Paragraph 18, line 4: Change "Gigure" to "Figure."

Paragraph 23, line 3: Change "which are of" to "which of."

Paragraph 29, line 2: Change "are be true" to "are true."

Paragraph 41, line 1: Change "At 130" to "At 230."

Paragraph 45, line 1: Change "At 140" to "At 240."

Paragraph 53, line 6: Change "system can image" to "system an image,"

Change "from at all" to "from it all."

Paragraph 54, line 2: Change "Rome and area" to "roam an area."

Paragraph 54, line 4: Change "president" to "present."

2. Claims 18, 19, 20, and 22 state that they depend on claim 1. These dependent claims state that claim 1 describes an article; however, claim 1 describes a method. Claims 18, 19, 20, and 22 must be modified in order to be consistent with claim 1. It is understood that these claims are actually dependent on claim 17, which describes an article.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, "said plurality of feature detectors" in line 9 lacks antecedent basis. The word "said" should be replaced with "a."

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 5-7, 9, 17, 19, 20, 22, 23, 25, 26, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by the article "Recognition of Planar Object Classes," by Burl et al. (hereinafter called Burl).

Regarding claim 1, Burl reveals the following:

A method, comprising:

analyzing a plurality of images (i.e. 150 face images, section 3, paragraph 1, line 2) which includes a specified desired feature therein (i.e. we have used only five features: the eyes, nose, and two nostrils, section 3, paragraph 2, lines 1-2) to select a plurality of selected features (i.e. Local detectors for these features were applied to each image, section 3, paragraph 2, lines 2-3); and automatically forming a model (i.e. probabilistic model, abstract, line 3) for further recognition of said specified feature, using said selected features (i.e. These [feature] candidates are then grouped into hypotheses, which are scored based on the spatial arrangement of the features, section 1, paragraph 2, lines 11-13).

7. Regarding claim 5, Burl reveals the following:

A method as in claim 1, wherein said automatically determining a model comprises probabilistically estimating which of the features are most informative for the model (i.e. [feature] candidates are then grouped into hypotheses, which are scored based on the spatial arrangement of the features, section 1, paragraph 2, lines 10-12).

8. Regarding claim 6, Burl discloses the following:

A method as in claim 5, wherein said automatically determining comprises assessing a joint probability function based on part appearance and shape (i.e. joint probability density over shape, section 1, column 1, paragraph 2, line 6).

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Note that Burl discusses shape but not appearance; however, the shape feature is understood to be an aspect of appearance.

9. Regarding claim 7, Burl discloses the following:

A method as in claim 5, further comprising assembling a matrix of feature candidate positions indicating possible relevant parts (i.e. the locations identified by a particular detector are treated as candidates for the actual feature. These can be organized into a data structure W, section 2.1, col. 1, paragraph 2, lines 5-8), and statistically assessing whether said relevant parts are likely to be useful (i.e. From W, we can formulate hypotheses about which of the candidate locations actually constitute an object, section 2.1, col. 1, paragraph 3, lines 1-3).

10. Regarding claim 9, Burl discloses the following:

A method as in claim 1, further comprising forming a model using a plurality of recognized parts (i.e. We will suppose that there are N types of features, col. 2, section 2.1, paragraph 1, lines 3-4).

11. Regarding claim 17, Burl reveals the following:

An article comprising:

A machine-readable medium which stores machine-executable instructions, the instructions causing a machine to:

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Automatically analyze a plurality of training images (section 2.4, col. 2, paragraph 5, line 6) which includes a specified desired feature therein (fig. 2), to select a plurality of selected features (i.e. eyes, nose, nostrils, section 3, col. 1, paragraph 2, line 2); and

Automatically form a model for further recognition of said specified feature, using said selected features (i.e. The required shape density parameters must be estimated from training examples, section 2.4, col. 1, paragraph 4, lines 1-3).

It is understood that the computer mentioned by Burl (SUN Sparc20, col. 1, section 3, paragraph 1, line 10) contains a machine-readable medium which stores machine-executable instructions.

Although Burl does not explicitly state that the steps described above are automatic, it is understood that they are performed automatically since they do not require any manual input.

12. Claim 19 is similar to claim 5, which is revealed by Burl, except that claim 19 describes an article instead of a method. However, as noted in the response to claim 17, Burl discloses an article comprising a machine-readable medium that stores machine-executable code. Thus, claim 19 is rejected on the same basis as claim 5. Refer to claim 5 for the rationale used to reject claim 19.

13. Claim 20 is similar to claim 7, which is revealed by Burl, except that claim 20 describes an article instead of a method. As noted in the response to claim 19, Burl also

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discloses and article which stores instructions. Therefore, claim 20 is rejected on the same basis as claim 7. See claim 7 for the rationale used to reject claim 20.

14. Regarding claim 22, Burl discloses the following:

An article as in claim 1, further comprising instructions to form a model using a plurality of recognized parts (i.e. with human faces the useful features might be areas with distinctive brightness patterns (eyes), texture (hair), color (lips), section 2.1, col. 2, paragraph 1, lines 5-8).

As noted in response to claim 17, Burl discloses an article that stores machine-readable instructions.

15. Regarding claim 23, Burl discloses the following:

An apparatus, comprising:

A computer (i.e. SUN Sparc20, section 3, col. 1, paragraph 1, line 10), forming:

A plurality of feature detectors (i.e. N types of features with a detector for each type, section 2.1, paragraph 1, col. 2, lines 3-4), reviewing images to detect parts in the images (i.e. Local detectors for these features were applied to each image, col. 1, section 3, paragraph 2, lines 2-3) some of those parts will correspond to the foreground as an instance of a target object class (i.e. object distribution, col. 2, section 2.3, paragraph 4, lines 15-16), and other parts not being an instance of the target object class, as part of the background (i.e. background distribution, col. 2, section 2.3, paragraph 4, lines 16-17);

A hypothesis evaluation part, that evaluates candidate locations identified by said plurality of feature detectors, to determine the likelihood of a feature corresponding to an instance of said target object class (i.e. likelihood ratio, equation 14, col. 2, section 2.3, paragraph 4).

16. Regarding claim 25, Burl discloses the following:

An apparatus as in claim 23, further comprising classifying the images into the classes of whether the object is present (c1) or whether the object is absent (c0) by choosing the class with the maximum a posteriori probability (i.e. maximum a posteriori rule, col. 1, section 2.2, paragraph 1, lines 1-3).

17. Claim 26 is the same as claim 23, except that claim 26 describes a method instead of an apparatus. However, the apparatus of claim 23 performs the same method as in claim 26, and therefore claim 26 is rejected on the same basis as claim 23. Refer to the discussion of claim 23 for the rationale used to reject this claim.

18. Claim 11 is rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent 5,774,576 (Cox et al., hereinafter called Cox).

Regarding claim 11, Cox reveals the following:

A method, comprising:

Automatically analyzing an image to find features therein (i.e. automatic feature-based face recognition, col. 1, lines 8-9);

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Grouping said features with other similar features to form clustered features (i.e. cluster facial patterns, col. 4, line 36);

Statistically analyzing said features using expectation maximization, to determine which of said features are statistically most relevant (col. 4, lines 55-58); and

Forming a model using the statistically most relevant features (col. 4, lines 55-58).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burl in view of Cox.

Regarding claim 2 (which depends on claim 1), Burl does not disclose the features of this claim. However, Cox discloses the following:

A method wherein said analyzing comprises automatically detecting features within said plurality of images (i.e. automatic feature-based face recognition, col. 1, lines 8-9; unsupervised metric learning, col. 5, lines 13-14).

Burl and Cox are analogous art because they both describe a method of object classification. Therefore it would have been obvious to one of ordinary skill in the art to

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combine unsupervised learning method of Cox with the classification method of Burl because it does not require input from the user or a preclassified training set of images.

21. Claims 3, 13, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burl and Cox in view of U.S. Patent 5,577,135 (Grajski et al., hereinafter called Grajski).

Regarding claim 3 (which depends on claim 2), Burl and Cox do not reveal the features of this claim. However, Grajski reveals the following:

A method comprising clustering among said features which are automatically detected by vector quantizing said features to reduce the total number of detected features (i.e. vector quantization is used to reduce the representation of segments from feature vectors, col. 2, line 65 to col. 3, line 1).

Burl, Cox, and Grajski are analogous art because they all involve feature extraction from images. Therefore, it would have been obvious to one of ordinary skill in the art to combine the work of Grajski with that of Burl and Cox because vector quantization is a well-known method of reducing the number of features, which decreases the complexity of the system and requires a smaller training set.

22. Claim 13 is similar to claim 3 and therefore this claim is rejected on the same basis. Refer to claim 3 which describes the rationale to reject this claim.

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23. Claim 18 is similar to claim 3, which is anticipated by Grajski, except that claim 18 describes an article instead of a method. However, the article of claim 18 performs the same function that is described in claim 3, and therefore it is rejected on the same basis. Refer to the discussion of claim 3 for the rationale used to reject claim 18. Grajski reveals a computer on which vector quantization is performed (fig. 1; col. 1, lines 46-52; col. 20, lines 24-26).

24. Claims 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burl in view of U.S. Patent 6,701,016 (Jojic et al., hereinafter called Jojic). Regarding claim 8, Burl does not reveal the features of this claim. However, Jojic reveals the following:

A method wherein said joint probability function (col. 13, lines 3-5) is estimated using expectation maximization (col. 13, lines 51-54).

Burl and Jojic are analogous art because they both describe statistical models for pattern recognition. Thus it would have been obvious to one of ordinary skill in the art to combine the methods of Burl and Jojic because expectation maximization is a well-known optimization method which is effective for graphical models (col. 13, lines 54-56).

25. Claim 21 is identical to claim 8, and therefore it is rejected on the same basis as claim 8.

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26. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cox in view of Burl.

Regarding claim 12, which depends on claim 11, Cox reveals an automated method of feature detection but he does not reveal the use of interest operators, also known as feature detectors. However, Burl reveals the following:

A method wherein said automatically analyzing comprises using an interest operator on a plurality of images (i.e. there are N types of features with a detector for each type, col. 2, section 2.1, paragraph 1, lines 3-4; We have tested our algorithm on a sequence of 150 face images, col. 1, section 3, paragraph 1, lines 1-2).

Cox and Burl are analogous art because they both describe ways to recognize features in images. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Cox with Burl because an interest operator is a well-known and effective method of extracting relevant features.

27. Claim 15 is similar to claim 5 and therefore it is rejected on the same basis as claim 5. Refer to claim 5 for the rationale used to reject this claim.

Cox and Burl are analogous art because they both describe a method of statistical classification of objects in images. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the methods of Cox and Burl because identifying the most useful features can reduce the complexity of the statistical model.

Allowable Subject Matter

28. Claims 4, 10, 14, 16, 24, 27, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following subject matter could not be found in the prior art:

Claim 4

Moving features which are spatially offset.

Claim 10

Determining if a change from one part to another part improves the result of the model.

Claim 14

Spatially moving features to group features which are different but spatially separated.

Claim 16

Establishing a correspondence between homologous parts across the training set of images.

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Claim 24

Assigning variables representing likelihood whether foreground or background to the parts in the matrix.

Claim 27

Assigning variables representing likelihood whether foreground or background to the parts in the matrix.

Claim 28

Classifying the images into the classes of whether the object is present or whether the object is absent by choosing the class with the maximum a posteriori probability.

29. Additional Prior Art

U.S. Patent 6,111,983 (Fenster et al.) describes a classification method in which the parameters of a statistical model are iteratively adjusted based on a set of training images. The model uses a joint probability distribution based on object shape. A feature function (i.e. interest operator) extracts features from images.

Castleman, Kenneth, Digital Image Processing, Prentice Hall, New Jersey, 1996.

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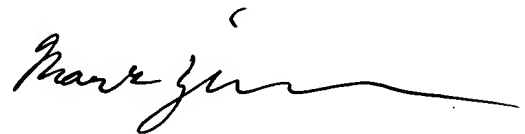
Castleman describes basic aspects of statistical classification, such as feature properties, feature selection, unsupervised training, and the use of a posteriori probability in maximum likelihood estimation.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael W. Bowen whose telephone number is (571)272-5969. The examiner can normally be reached on M-F 8AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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